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STATISTICAL ANALYSIS OF THE ANNUAL AVERAGE F.O.B. PRICES OF
CANNED CLINGSTONE PEACHES, 1924-25 TO 1939-40

by

H. R. Wellman

June, 1940

Contribution from the
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STATISTICAL ANALYSIS OF THE ANNUAL AVERAGE F.O.B. PRICES OF

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^{1/}
H. R. Wellman

The purpose of this report is to present the results of an analysis of the major factors which have influenced the annual average f.o.b. prices received for canned clingstone peaches by canners in California from 1924-25 through 1939-40.

In this analysis the average relationships which prevailed from 1924-25 through 1938-39 between the f.o.b. prices of canned clingstone peaches and three factors were measured. These three factors are (1) total domestic shipments of California canned peaches, including both clingstones and freestones, (2) index of nonagricultural income payments in the United States, and (3) adjusted index of prices of competing canned fruits.

The average relations between the f.o.b. price and each of the independent variables are shown graphically by the diagonal lines in figure 1. Expressed in numerical terms these relations are as follows: (a) A change of one million cases in domestic shipments of canned peaches was on the average accompanied by a change in the opposite direction of 15 cents a case in the f.o.b. price of canned clingstone peaches; (b) a change of 10 points in the index of nonagricultural income in the United States was on the average accompanied by a change in the same direction of 47 cents a case in the f.o.b. price; and (c) a change of 10 points in the adjusted index of prices of competing canned fruits was on the average accompanied by a change in the same direction of 25 cents a case in the f.o.b. price.

Differences between the actual prices and those explained by the correlation analysis are given in table 2, column 3. These differences are plotted as deviations from the regression line in figure 1, section C.

Data for the year 1939-40, which are in part preliminary, are also shown in the tables and charts. It will be noted that the actual f.o.b. price received by canners for canned clingstone peaches in 1939-40 was 24 cents a case below that expected on the basis of the preliminary figures on domestic shipments of canned peaches, index of nonagricultural income and adjusted index of prices of competing canned fruit. The difference between actual and estimated prices was larger in 1939-40 than in any of the previous 15 years. The next largest difference was in 1930-31 when the actual price was 15 cents a case below the estimated price.

As a check upon the analysis with price as the dependent variable, a correlation analysis was also made in which quantity of domestic shipments was taken as the dependent variable. In this latter analysis the emphasis is shifted from the factors influencing the f.o.b. prices of canned clingstone peaches to the factors influencing the domestic consumption of canned peaches. Total movement out of canners' hands minus exports is assumed to equal domestic consumption.

The average relations between domestic consumption of canned peaches and each of the three variables -- f.o.b. prices of canned clingstone peaches, index of nonagricultural income, and adjusted index of competing canned fruit prices --

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STATISTICAL ANALYSIS OF THE ANNUAL AVERAGE F.O.B. PRICES OF
CANNED CLINGSTONE PEACHES, 1934-35 TO 1939-40

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The purpose of this report is to present the results of an analysis of the major factors which have influenced the annual average f.o.b. prices received for canned clingstone peaches by canners in California from 1934-35 through 1939-40.

In this analysis the average relationships which prevailed from 1934-35 through 1938-39 between the f.o.b. prices of canned clingstone peaches and three factors were measured. These factors are (1) total domestic shipments of California canned peaches, including both clingstone and freestone, (2) index of nonagricultural income payments in the United States, and (3) adjusted index of prices of competing canned fruits.

The average relations between the f.o.b. price and each of the independent variables are shown graphically by the diagonal lines in Figure 1. Expressed in numerical terms these relations are as follows: (a) A change of one million cases in domestic shipments of canned peaches was on the average accompanied by a change in the opposite direction of 15 cents a case in the f.o.b. price of canned clingstone peaches; (b) a change of 10 points in the index of nonagricultural income in the United States was on the average accompanied by a change in the same direction of 41 cents a case in the f.o.b. price; and (c) a change of 10 points in the adjusted index of prices of competing canned fruits was on the average accompanied by a change in the same direction of 28 cents a case in the f.o.b. price.

Differences between the actual prices and those explained by the correlation analysis are given in Table 2, column 2. These differences are plotted as deviations from the regression line in Figure 1, section C.

Data for the year 1939-40, which are in part preliminary, are also shown in the tables and charts. It will be noted that the actual f.o.b. price received by canners for canned clingstone peaches in 1939-40 was 14 cents a case below that expected on the basis of the preliminary figures on domestic shipments of canned peaches, index of nonagricultural income, and adjusted index of prices of competing canned fruit. The difference between actual and estimated prices was larger in 1939-40 than in any of the previous 15 years. The next largest difference was in 1930-31 when the actual price was 12 cents a case below the estimated price.

As a check upon the analysis with price as the dependent variable, a correlation analysis was also made in which quantity of domestic shipments was taken as the dependent variable. In this latter analysis the emphasis is shifted from the factors influencing the f.o.b. prices of canned clingstone peaches to the factors influencing the domestic consumption of canned peaches. Total movement out of canners' hands minus exports is assumed to equal domestic consumption.

The average relations between domestic consumption of canned peaches and each of the three variables — f.o.b. prices of canned clingstone peaches, index of nonagricultural income, and adjusted index of competing canned fruit prices —

are shown graphically in figure 2. These relations may be stated as follows: (a) On the average a change of \$1.00 a case in the f.o.b. price of canned clingstone peaches was accompanied by a change in the opposite direction of 5,856,000 cases in domestic consumption of canned peaches; (b) a change of 10 points in the index of nonagricultural income was on the average accompanied by a change in the same direction of 2,826,000 cases in the domestic consumption of canned peaches; and (c) a change of 10 points in the adjusted index of prices of competing canned fruits was on the average accompanied by a change in the same direction of 1,384,000 cases in domestic consumption of canned peaches.

Differences between actual domestic shipments and those estimated on the basis of the analysis are shown in table 2, column 6. They are also shown as deviations from the regression line in figure 2 C. In this case as in the case when price is taken as the dependent variable the largest difference between actual and estimated values was in 1939-40 and the next largest difference was in 1930-31.

The unusually large negative difference in 1939-40, whether measured in terms of price or in terms of quantity, indicates that the domestic demand for canned peaches relative to the buying power of consumers and prices of competing canned fruits was low last season as compared with previous years. It seems probable that some factor or factors which exerted little influence in previous years were of considerable importance in 1939-40. Just what these factors were, however, we do not know.

Mathematical Note.-- With price as the dependent variable and the three factors mentioned above as the independent variables, the multiple linear regression equation fitted by the method of least square to the series covering the years 1924-25 through 1938-39 is

$$X_1 = -2.32321 - 0.01471X_2 + 0.04730X_3 + 0.02519X_4$$

$$(0.00178) \quad (0.00182) \quad (0.00228)$$

Where X_1 is the annual average f.o.b. price of canned clingstone peaches (in dollars per case),

X_2 is the domestic shipments of California canned peaches, including both clingstones and freestones (in units of 100,000 cases),

X_3 is the index of nonagricultural income in the United States (in percentage points),

X_4 is the adjusted index of prices of competing canned fruits (in percentage points).⁴

The figures in parentheses are the standard errors of the net regression coefficients.

The standard error of estimate, $\bar{S}_{1.234} = \$0.085$ per case

The adjusted coefficient of multiple correlation $\bar{R}_{1.234} = .9921$

The adjusted coefficient of multiple determination $\bar{R}_{1.234}^2 = .98$

the estimated coefficient of multiple correlation $R^2 = .88$

the estimated coefficient of multiple correlation $R^2 = .8057$

the estimated error of estimate $E = 30.000$ per cent

coefficients.

The values in parentheses are the standard errors of the regression

coefficients.

X^1 is the index of number of years of completed school years (in parentheses)

coefficients.

X^2 is the index of nonemployment income in the past year (in parentheses)

coefficients and standard errors (in units of 100,000 units).

X^3 is the estimated coefficient of correlation between the

variables.

where X is the index value of $1.0 \cdot 0.0$ value of standard deviation (in parentheses)

$$(0.00000) \quad (0.00000) \quad (0.00000)$$

$$X^1 = -3.22227 + 0.0141X^2 + 0.04220X^3 + 0.0321X^4$$

1934-35 through 1939-40

estimates of the regression coefficients are given in the table below. The values in parentheses are the standard errors of the regression coefficients. The values in parentheses are the standard errors of the regression coefficients.

the regression coefficients.

the regression coefficients in 1939-40. The values in parentheses are the standard errors of the regression coefficients. The values in parentheses are the standard errors of the regression coefficients.

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the regression coefficients in 1939-40.

the regression coefficients in 1939-40. The values in parentheses are the standard errors of the regression coefficients. The values in parentheses are the standard errors of the regression coefficients.

With domestic shipments as the dependent variable, the multiple linear regression equation is

$$X_2 = -120.5959 + 58.5633X_1 + 2.8262X_3 + 1.3843X_4$$

(7.0850) (0.3115) (0.2758)

The standard error of estimate, $\bar{S}_{2.134} = 537,000$ cases

The adjusted coefficient of multiple correlation $\bar{R}_{2.134} = .9445$

The adjusted coefficient of determination $\bar{R}_{2.134}^2 = .89$

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TABLE 1

Variables Used in the Analysis

Year June through May	F.o.b. price canned cling- stone peaches	Domestic shipments of California canned peaches	Index of nonagricul- tural income	Adjusted index of prices of competing canned fruits
	1	2	3	4
	<u>dollars</u> <u>per case</u>	<u>1,000</u> <u>cases</u>	<u>per cent</u>	<u>per cent</u>
1924-25	4.21	5,637	91.1	122.9
1925-26	3.78	8,511	98.8	101.2
1926-27	3.66	9,046	101.1	97.9
1927-28	3.17	11,163	101.8	93.3
1928-29	3.22	10,800	105.5	88.2
1929-30	4.08	7,845	106.6	96.6
1930-31	2.88	9,402	94.0	91.5
1931-32	2.55	6,058	78.2	83.1
1932-33	1.97	8,189	63.0	100.0
1933-34	2.31	7,481	67.2	102.7
1934-35	2.69	8,006	73.7	104.5
1935-36	2.51	8,723	80.8	91.6
1936-37	2.66	9,877	92.2	79.2
1937-38	2.96	7,532	92.4	83.3
1938-39	2.30	10,668	89.2	77.4
1939-40	2.44*	9,504	94.4†	78.4†

* Price No. 2 $\frac{1}{2}$ Choice cling peaches 1939-40, \$1.28 per dozen cans.

† Preliminary -- subject to revision.

Sources of data:

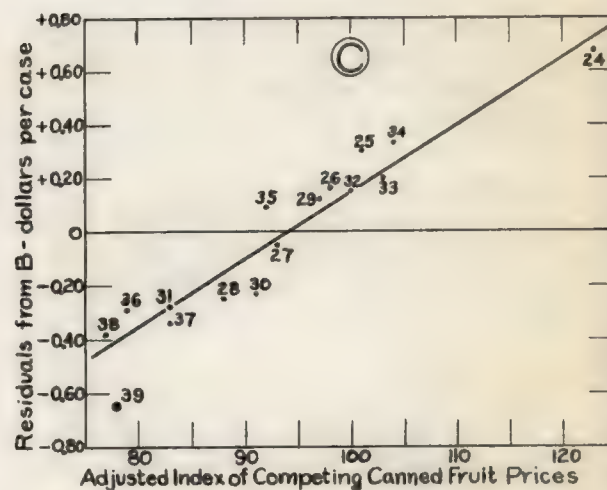
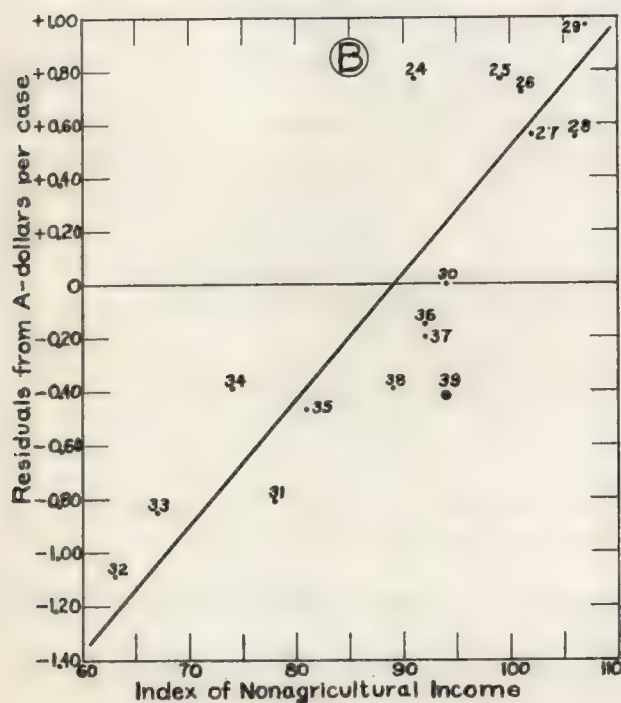
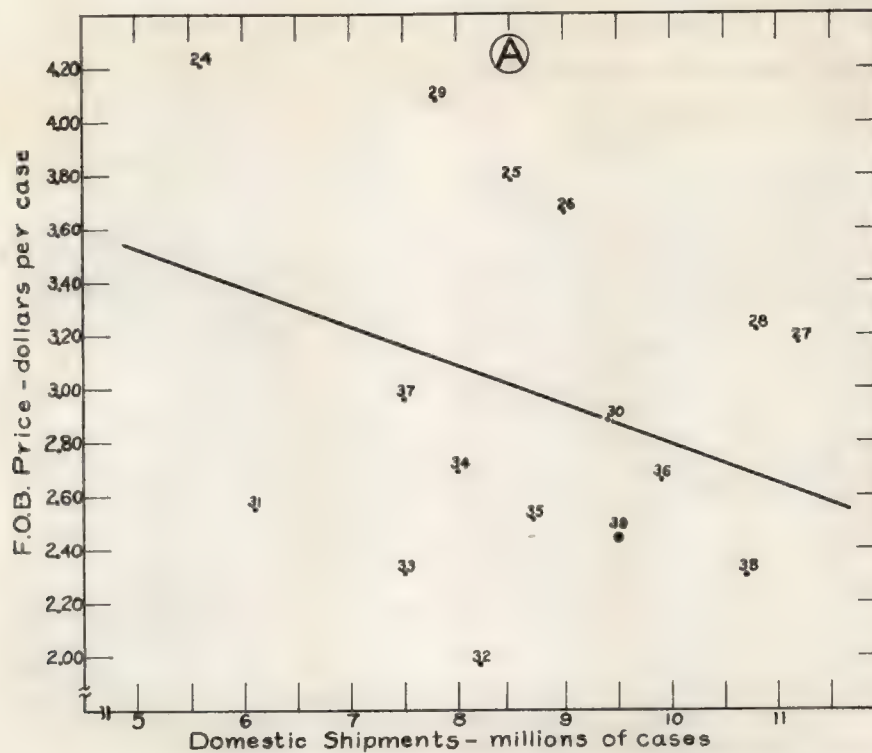
Col. 1: Compiled from reports by canners. Prices are weighted average prices of canned clingstone peaches received by canners, f.o.b. cannery or dock, for all grades and sizes of cans on an unadvertised basis. Regular brokerage, cash discount, swell allowance, label allowance, and case allowance are included.

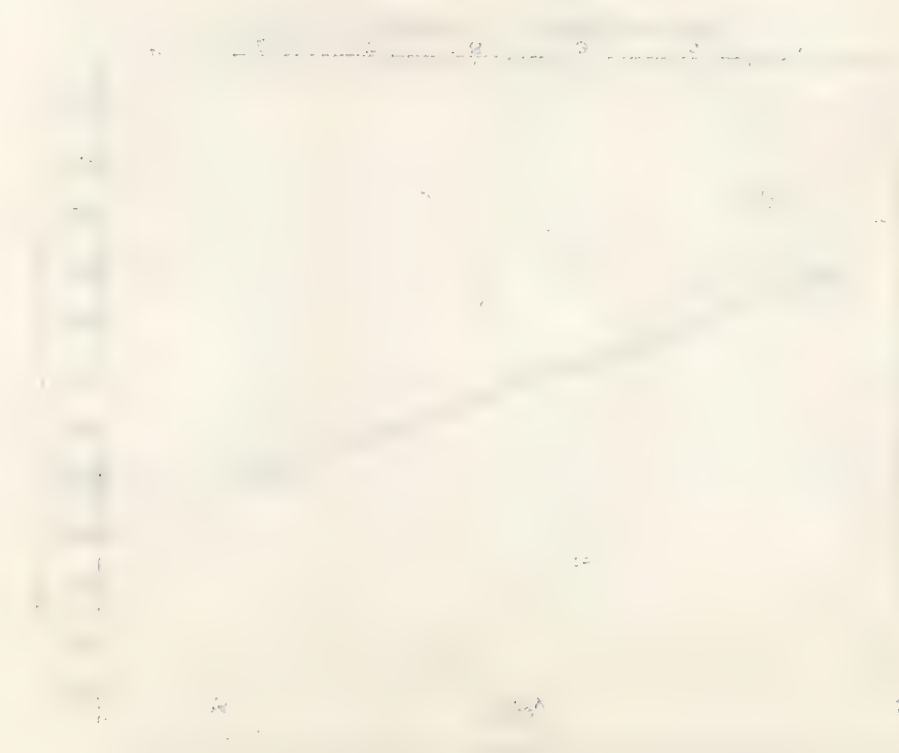
Col. 2: Total shipments minus exports. Total shipments compiled by the Canners League of California and the Canning Peach Industry Board. Figures include both clingstones and freestones on a No. 2 $\frac{1}{2}$ basis. Exports from United States Department of Commerce, Monthly Summary of Foreign Commerce of the United States. See tables 3 and 4.

Col. 3: Simple average of the monthly indices of national income, excluding agricultural income, 1924-29 average equals 100. See table 6. Year 1939-40 estimated. Index for May was assumed to be the same as for April.

Col. 4: For sources and method of construction see table 5.

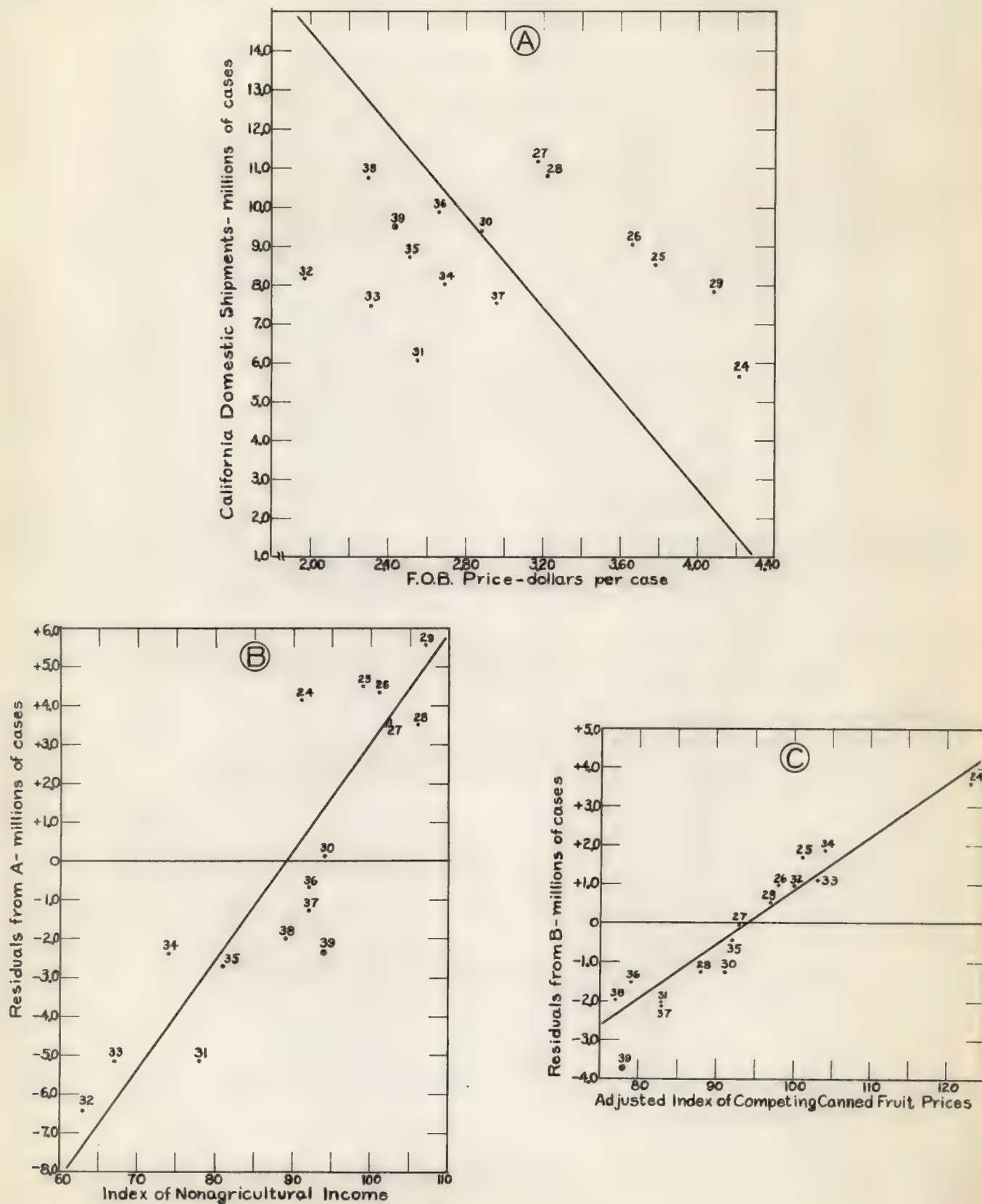
FIG. 1.-- CALIFORNIA CANNED PEACHES: AVERAGE F.O.B. PRICES RECEIVED BY CANNERS RELATED TO (A) DOMESTIC SHIPMENTS OF CANNED PEACHES, (B) INDEX OF NONAGRICULTURAL INCOME, AND (C) ADJUSTED INDEX OF PRICES OF COMPETING CANNED FRUITS, 1924-25 TO 1939-40.





The following is a list of the names of the persons who have been
 named in the above mentioned report.

FIG. 2.-- CALIFORNIA CANNED PEACHES: DOMESTIC SHIPMENTS OF CANNED PEACHES RELATED TO (A) AVERAGE F.O.B. PRICES RECEIVED BY CANNERS, (B) INDEX OF NONAGRICULTURAL INCOME, AND (C) ADJUSTED INDEX OF COMPETING CANNED FRUITS, 1924-25 TO 1939-40.



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TABLE 2

Actual and Estimated F.O.B. Prices and Domestic Shipments
of California Canned Peaches, 1924-25 to 1939-40

Year June through May	Price as dependent variable			Domestic shipments as dependent variable		
	Actual price	Estimated price	Col. 1 minus col. 2	Actual shipments	Estimated shipments	Col. 4 minus col. 5
	1	2	3	4	5	6
	<u>dollars</u> <u>per case</u>	<u>dollars</u> <u>per case</u>	<u>dollars</u> <u>per case</u>	<u>1,000</u> <u>cases</u>	<u>1,000</u> <u>cases</u>	<u>1,000</u> <u>cases</u>
1924-25	4.21	4.25	-0.04	5,640	6,030	- 390
1925-26	3.78	3.65	+0.13	8,510	7,760	+ 750
1926-27	3.66	3.59	+0.07	9,050	8,620	+ 430
1927-28	3.17	3.19	-0.02	11,160	11,080	+ 80
1928-29	3.22	3.31	-0.09	10,800	11,220	- 420
1929-30	4.08	4.03	+0.05	7,840	7,710	+ 130
1930-31	2.88	3.03	-0.15	9,400	10,240	- 840
1931-32	2.55	2.55	0.00	6,060	6,540	- 480
1932-33	1.97	1.96	+0.01	8,190	8,050	+ 140
1933-34	2.31	2.33	-0.02	7,480	7,610	- 130
1934-35	2.69	2.60	+0.09	8,010	7,500	+ 510
1935-36	2.51	2.54	-0.03	8,720	8,870	- 150
1936-37	2.66	2.57	+0.09	9,880	9,300	+ 580
1937-38	2.96	3.02	-0.06	7,530	8,100	- 570
1938-39	2.30	2.24	+0.06	10,670	10,280	+ 390
1939-40*	2.44	2.68	-0.24	9,500	11,010	-1,510

* Preliminary, subject to revision.

Sources of data:

Cols. 1 and 4: From table 1, cols. 1 and 2.

Col. 2: Based upon readings from figure 1.

Col. 5: Based upon readings from figure 2.

TABLE 3

Pack, Carryover, Shipments, and Exports of California Canned Peaches

1932-33 to 1938-39

Year, June through May	Pack	Carryover from preceding year	Available for shipment	Carryover into following year	Shipments	Exports
	1	2	3	4	5	6
	<u>1,000</u> <u>cases*</u>	<u>1,000</u> <u>cases*</u>	<u>1,000</u> <u>cases*</u>	<u>1,000</u> <u>cases*</u>	<u>1,000</u> <u>cases*</u>	<u>1,000</u> <u>cases*</u>
1932-33	6,438	4,845	11,283	1,361	9,922	1,733
1933-34	10,309	1,361	11,670	2,390	9,280	1,799
1934-35	8,598	2,390	10,988	1,856	9,132	1,126
1935-36	11,216	1,856	13,072	2,042	11,030	2,307
1936-37	10,711	2,042	12,753	1,567	11,186	1,309
1937-38	13,248	1,567	14,815	6,012	8,803	1,271
1938-39	9,822	6,012	15,834	3,006	12,828	2,160
1939-40	11,462	3,006	14,468	2,964	11,504	2,000

* No. $2\frac{1}{2}$ can basis. Includes both clingstones and freestones.

Sources of data:

Cols. 1, 2, and 4: From table 4.

Col. 3: Col. 1 plus col. 2.

Col. 5: Col. 3 minus col. 4.

Col. 6: Compiled from U. S. Dept. Com., Monthly Summary of Foreign Commerce of the United States, monthly issues. Pounds were converted to cases on the basis of 45 pounds per case. Year 1939-40 estimated. Exports during the first eleven months of 1939-40 amounted to 1,945,000 cases as compared with exports of 2,012,000 cases during the first eleven months of 1938-39.

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TABLE 4

Pack and Carryover of Canned Clingstone and Canned Freestone

Peaches, California, 1932-1939

Year	Pack			Carryover on June 1		
	Clingstones	Freestones	Total	Clingstones	Freestones	Total
	1	2	3	4	5	6
	<u>cases*</u>	<u>cases*</u>	<u>cases*</u>	<u>cases*</u>	<u>cases*</u>	<u>cases*</u>
1932	6,413,972	23,542	6,437,514	4,826,031	18,776	4,844,807
1933	10,243,976	65,144	10,309,120	1,359,322	1,920	1,361,242
1934	8,258,344	340,011	8,598,355	2,388,702	1,746	2,390,448
1935	10,850,492	365,769	11,216,261	1,835,681	20,494	1,856,175
1936	10,236,033	475,091	10,711,124	1,929,309	112,591	2,041,900
1937	12,205,478	1,042,953	13,248,431	1,497,640	69,039	1,566,679
1938	9,445,927	376,423	9,822,350	5,577,609	434,831	6,012,440
1939	10,579,366	882,463	11,461,829	2,737,089	269,367	3,006,456
1940				2,690,432	273,173	2,963,605

* No. 2½ can basis.

Sources of data:

Compiled by the Cannery League of California and the Canning Peach Advisory Board.

The pack figures do not include peaches packed directly into fruit salad and fruit cocktail, but do include canned peaches re-manufactured into those items. The pack of 10,236,033 cases of clingstones in 1936 does not include 115,619 cases of spiced peaches; the pack of 12,205,478 cases of clingstones in 1937 does not include 111,280 cases of spiced peaches; the pack of 9,445,927 cases of clingstones in 1938 does not include 24,944 cases of spiced peaches; and the pack of 10,579,366 cases of clingstones in 1939 does not include 195,681 cases of spiced peaches.

The carryover figures are total stocks on hand sold and unsold.

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TABLE 5

Construction of Index of Prices of Canned Fruits Competing with Canned Peaches
1932-33 to 1938-39

Year June through May	Prices			Relatives of prices			Unadjusted index of competing canned fruit prices	Index of nonagri- cultural income	Adjusted index of competing canned fruit prices
	Canned Bartlett pears	Canned apricots	Canned pine- apples	Canned Bartlett pears	Canned apricots	Canned pine- apples			
	1	2	3	4	5	6	7	8	9
	dollars per case	dollars per case	dollars per doz- en cans	1924-1929 = 100					
1932-33	2.48	2.23	1.60	52	58	70	63	63.0	100.0
1933-34	2.64	2.37	1.80	55	62	79	69	67.2	102.7
1934-35	3.05	3.47	1.80	64	90	79	77	73.7	104.5
1935-36	2.92	2.93	1.80	61	76	79	74	80.8	91.6
1936-37	2.92	2.75	1.80	61	71	79	73	92.2	79.2
1937-38	3.07	3.02	1.90	64	78	83	77	92.4	83.3
1938-39	2.77	2.55	1.71	58	66	75	69	89.2	77.4
1939-40	3.27	2.77	1.79	68	72	78	74	94.4*	78.4*

* Preliminary -- subject to revision.

Sources of data:

Cols. 1 and 2: Compiled from records of canners. Prices are weighted average prices for all grades and sizes of cans, f.o.b. cannery. Canned Bartlett pear prices are for the Pacific Coast; canned apricot prices for California.

Col. 3: Opening prices for No. 2½ Sliced Fancy Pineapple, Hawaii, as given in Western Canner and Packer, 1937 Yearbook, p. 85. 1937-38 to 1939-40 prices from California Fruit News, weekly issues.

Cols. 4, 5, and 6: Prices given in cols. 1, 2, and 3 in per cent of their 1924-29 averages -- canned Bartlett pears, \$4.783; canned apricots, \$3.848; canned pineapples, \$2.292.

Col. 7: Weighted combination of relatives given in cols. 4, 5, and 6, using following weights: canned Bartlett pears, 3; canned apricots, 2; canned pineapples, 6.

Col. 8: From table 1, col. 3.

Col. 9: Col. 7 divided by col. 8.

TABLE 6

Nonagricultural Income Payments, United States, June 1932 to Date

(Seasonally corrected indexes, 1924-29 = 100)

Year	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June-May average
1932-33	66.6	65.2	64.6	64.2	64.2	63.5	63.3	62.8	62.1	60.2	59.6	60.2	63.0
1933-34	61.3	61.8	63.9	64.9	65.5	66.1	68.3	70.4	70.7	71.3	70.7	71.6	67.2
1934-35	71.6	72.1	72.6	71.5	72.5	73.2	73.5	74.9	75.6	75.5	75.9	75.6	73.7
1935-36*	75.8	76.2	77.3	78.1	79.0	79.8	81.1	82.7	83.6	84.6	85.1	86.1	80.8
1936-37*	87.2	88.3	89.7	90.3	91.6	92.4	93.0	92.9	93.8	95.1	95.7	96.4	92.2
1937-38	96.9	97.1	97.7	96.7	96.0	94.1	91.7	88.9	88.1	87.9	87.0	86.1	92.4
1938-39	86.1	86.2	88.0	88.3	89.0	89.8	90.3	90.6	90.6	91.1	90.0	90.5	89.2
1939-40	91.7	91.8	93.1	93.4	95.4	96.1	96.6	96.4	95.4	95.0	94.0 [†]	--	94.4 [‡]

* Exclusive of veteran bonus payments. Bonus payments in other years were of little significance.

† Preliminary.

‡ Assuming index for May 1940 will be the same as preliminary index for April 1940.

Sources of data:

June 1932-August 1939: United States Department of Agriculture Bureau of Agricultural Economics, mimeographed release of Nov. 16, 1939.

September 1939- : United States Department of Commerce, Survey of Current Business, monthly issues. To extend the monthly indexes forward, multiply the adjusted indexes of nonagricultural income payments reported on a 1929 base regularly in the Survey of Current Business, United States Department of Commerce, by 107.4 per cent.

